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Costs and Benefits of Seasonal Migration: Evidence from India *

Clément Imbert[†] and John Papp[‡]

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Abstract

This paper provides new evidence on rural-to-urban migration decisions in developing countries. Using original survey data from rural India, we show that employment provision on local public works significantly reduces seasonal migration. Workers who choose to participate in the program forgo much higher earnings outside of the village. Structural estimates imply that the utility cost of one day away may be as high as 60% of migration earnings. Up to half of this cost can be explained by higher living costs and income risk. The other half likely reflects high non-monetary costs from living and working in the city.

Keywords: Internal Migration, Workfare Programs, India, Urban, Rural.

JEL Classification: H53, J22, J61, O15, R23

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[†]University of Warwick, Department of Economics, Coventry, UK, c.imbert@warwick.ac.uk.

[‡]R.I.C.E.,johnhpapp@gmail.com

1 Introduction

The presence and persistence of large average wage gaps between rural and urban areas of developing countries is a puzzle for economists. In India, the real wage gap between rural and urban areas is above 20% and permanent migration between rural and urban areas is consistently low, around 0.5% per year (Hnatkovska and Lahiri, 2013; Munshi and Rosenzweig, 2016). One possible explanation for this fact is that mobility frictions prevent workers from being optimally allocated across sectors, with negative effects on total output (Gollin et al., 2014; Bryan and Morten, 2015). Another is that the most productive workers sort into urban areas, so that despite large average wage gaps returns to migrating for the marginal worker are close to zero (Young, 2013; Hicks et al., 2017).

The study of seasonal migrants, who constantly arbitrage between returns to labor in rural and urban labor markets can shed light on these issues. In India in 2007-08, over 8.5 million rural adults spent one to six months away from the village to work in urban areas (National Sample Survey Office, 2012). Seasonal migrants enjoy significant consumption and income gains by moving to urban areas during the off-season of agriculture (Bryan et al., 2014). Also, seasonal migrants do not face the same costs of moving as long-term migrants: they do not have to sell their land, or lose the support of informal insurance networks (Munshi and Rosenzweig, 2016). A natural question is then why do not more rural workers migrate seasonally to work in urban areas.

In this paper, we present unique empirical evidence on the costs and benefits of rural-to-urban migration. We use original survey data collected by John Papp with Diane Coffey and Dean Spears (Coffey et al., 2015) in a high out-migration area located at the border of three Indian states (Rajasthan, Madhya Pradesh and Gujarat). We exploit variation in employment provision under India's workfare program, the National Rural Employment Guarantee Act (NREGA), across seasons and states to shed light on migration decisions.[1] The effect of the program on migration is a priori ambiguous. On the one hand it provides additional income and relaxes cash constraints, which may increase migration (Angelucci, 2015). On the other, it provides local employment opportunities when agricultural work is scarce, thus offering an alternative to migration (Imbert and Papp, 2016).[2]

We find that availability of NREGA work has a strong negative effect on seasonal migra-

[1] Workfare programs are income support schemes which provide employment on local public works (Ravallion, 1987). Public works programs were active in 94 countries in 2014 (The World Bank, 2015).

[2] The insurance effects of the program are equally ambiguous. On the one hand, the program reduces income risk, which may encourage migration (Munshi and Rosenzweig, 2016). On the other, it offers an alternative risk-coping strategy, which may crowd-out distress migration (Morten, 2016).

tion: in Rajasthan villages, the average adult worked nine more days on local public works during the summer months and migrated six fewer days. Given that the NREGA wage is 36% lower than earnings outside of the village, the utility costs associated with migration need to be large for migrants to prefer NREGA work. We estimate a simple structural model of migration decisions and show that the utility cost of one day away may be as high as 60% of migration earnings. Using detailed information on migrants' destinations and migration history, we show that up to half of the estimated migration costs can be explained by higher living costs in urban areas and income risk associated with migration. The other half reflects non-monetary costs of living and working in the city.

To evaluate the effect of the NREGA on short-term migration, our identification strategy relies on variation in program implementation across states and seasons. We leverage the unique design of our survey, which covered 35 village pairs including 35 villages in Rajasthan and 35 matched villages just across the border in Madhya Pradesh and Gujarat.[3] We first show that virtually all NREGA employment is provided during the summer months (mid-March to mid-July), and that 35% more work is provided in Rajasthan villages than in villages in other states. These differences in NREGA employment reflect differences in supply, not demand for NREGA work.[4] We next find that in Rajasthan, during the summer, the average respondent spends 23% less time migrating and is 18% less likely to migrate at all.

We perform a number of robustness checks to show that our estimates are indeed identifying the effect of the NREGA and not differences in rural poverty and migration patterns unrelated to the program. First, there is no difference in migration across states in the winter, when short-term migration is high but no NREGA employment is provided. Second, our estimates do not change when we control for worker characteristics and include village pair fixed effects. Third, our results strengthen when we use only village pairs between Rajasthan and Madhya Pradesh, which are more comparable in terms of transport infrastructures. Finally, based on retrospective questions, we find no significant differences in reported levels of migration across states in 2005, before NREGA implementation. There is also no difference in permanent migration across states.

It is perhaps surprising that migration appears to be so strongly affected by the workfare program, given that daily earnings outside of the village are much higher than public works wages.[5] These large wage differentials combined with high demand for NREGA work suggest

[3]Villages were matched based on population composition and agricultural production (see Section 2).

[4]There is abundant evidence that demand under the NREGA is rationed (Dutta et al., 2012, 2014). NREGA beneficiaries need to register locally, hence one cannot migrate to apply for NREGA work elsewhere.

[5]The gap in earnings could simply reflect differential productivity between migrants and NREGA partic-

substantial migration costs. We investigate this question formally by modeling household short-term migration decisions in a framework similar to Benjamin (1992). Short-term migration provides a higher monetary return than local work but workers also incur a flow cost for each day spent away. We estimate the model structurally to match expressed demand for NREGA work among migrants. Our estimates imply that the flow cost of one day away may be as high as 60% of daily earnings in the city.

The utility cost of migration may be due to a wide range of factors, which we attempt to quantify using detailed information about migrants' trips. We first consider differences in living costs between the village and the city. Using the ratio of poverty lines at destination and origin as a deflator and making different assumptions about migrants' consumption basket, we find that price differences may explain up to 18% of the estimated migration cost. We next quantify the utility cost of income risk. To measure the variance of migration earnings, we use variation in earnings for the same individual across years. Under reasonable assumptions about risk aversion, we find that the disutility of income risk may explain up to 27% of the estimated migration cost. The remaining 55% are likely due to the disutility of rough living and working conditions at destination. We show that this cost is higher among older migrants, and among migrants who have electricity at home. We find mixed evidence on destination amenities (crime and air pollution).

This paper contributes to the literature in three ways. First, we present new causal evidence on the effect of workfare programs on private sector employment. The existing evidence is mixed and focuses on local impacts (Zimmermann, 2012; Imbert and Papp, 2015; Muralidharan et al., 2017; Berg et al., 2018).[6] Some studies have argued that India's NREGA may provide an alternative to seasonal migration (Jacob, 2008; Ashish and Bhatia, 2009). In particular, Morten (2016) simulates the effect of an employment guarantee on pre-NREGA data and predicts that by offering an alternative insurance mechanism, the NREGA should crowd-out migration. Our contribution is to provide the first causal evidence of NREGA's impact on rural-to-urban migration using a dedicated survey and a border discontinuity design. We show that workfare programs operating during the agricultural off-season may have a significant negative impact on employment outside of the village. In a follow-up paper, we confirm this finding using nationally representative data and estimate the effect of the decline in seasonal migration on urban wages (Imbert and Papp, 2016).

Second, we use demand for employment on public works among migrants to shed light

ipants, but the wage differential persists even for adults who both migrate and do NREGA work.

[6] India's NREGA being the largest workfare program in the world, has attracted more attention, but(Beegle et al., 2017) and Alik-Lagrange et al. (2017) study public works programs in other contexts.

on the determinants of migration decisions in developing countries. The literature highlights the importance of financial constraints, and reliance on village-based insurance networks (Angelucci, 2015; Bazzi, 2017; Munshi and Rosenzweig, 2016). Since these costs are high for permanent migration, Bryan et al. (2014) argue that temporary migration to urban areas during the off-season of agriculture could be a "profitable technology". They find that a small transport cost subsidy in rural Bangladesh has large positive effects on seasonal migration, and brings significant income and consumption gains. They argue that the subsidy alleviates the uninsured risk of failed migration and the lack of information on returns to migration. In contrast, we study villages where 71% of households have a migrant, so that migration earnings are common knowledge. We find that short-term migration decisions are mostly driven by (the lack of) employment opportunities in the village, given the large disutility cost of working in the city. Income risk explains about 27% of this cost.[7]

Third, we quantify migration costs based on information on earnings for the same worker performing the same task in and outside of the village. This helps overcome selection issues which plague the debate on the existence of the rural-urban wage gap in developing countries. The literature often interprets differences in real wages, or productivity per worker between rural and urban areas as evidence of "wedges", or barriers to migration (Gollin et al., 2014; Munshi and Rosenzweig, 2016). However, Young (2013) argues that in 65 countries the entire gap can be explained by the fact that production in urban areas is more skill intensive, and attract more skilled workers. Hicks et al. (2017) also find little income gains for workers who settle down in urban areas in Indonesia. Our contribution is to show that the same worker doing the same task in the same season can earn 57% more on urban private construction sites than on local public works. To rationalize the fact that most of them still prefer to join the program, migration costs have to be high. We provide evidence that this opportunity cost has an important non-monetary component.

The following section describes the workfare program and presents the data set used in the paper. Section 3 uses variation in public employment provision across states and seasons to estimate the impact of the program on short-term migration. Section 4 uses detailed information on migration and demand for public works to provide structural estimates of migration costs. Finally, Section 5 considers different components of the estimated migration cost and attempts to quantify them.

[7] A recent re-evaluation of the Bryan et al. (2014) Bangladesh experiment by Lagakos et al. (2018) argues that the welfare gains from migration subsidies may be limited by a large non-monetary cost of migration.

2 Context and data

2.1 NREGA

This paper studies India's National Rural Employment Guarantee Act (NREGA), which entitles every household in rural India to 100 days of work per year at a state-level minimum wage. The NREGA is the largest workfare program in the world: in 2016-17 it provided 2.36 billion person-days of employment to 51 million households.[8] Implementation is highly heterogeneous across states (Dreze and Khera, 2009; Dreze and Oldiges, 2009). As Figure 1 shows, the number of days spent on public works by the average rural adult ranges from almost zero in Haryana (HR) to 12 in Andhra Pradesh (AP), and varies widely across the three states of our study: Rajasthan (RJ) provides 11 days of public works employment per adult, Madhya Pradesh (MP) 2.6 days, and Gujarat (GJ) 1.4 days.[9] Dutta et al. (2012) argue that cross-states differences in NREGA implementation do not reflect underlying demand for NREGA work. Rather than socio-economic conditions, the quality of NREGA implementation seems to be explained by some combination of political will, administrative capacity, and previous experience in providing public works.

Employment provision under the NREGA also varies within the year. Public works are often closed at the time of the monsoon (July) and reopen after the main (*kharif*) harvest (December). As a result, most NREGA employment is provided during the first half of the year. The seasonality of NREGA works is driven by both practical and political considerations. Most NREGA works are construction projects, which are difficult to carry out during the heavy monsoon rains. Also, local governments in charge of NREGA implementation tend to avoid competing with demand for work in agriculture (Association for Indian Development, 2009). Figure 2 shows the variation in time spent on public works across quarters during the agricultural year 2009-10 in the three states of our study (Gujarat, Madhya Pradesh and Rajasthan), according to NSS data. Public employment drops from 2.5 days to 1.25 between the second and third quarter, and stays below one day in the fourth and first quarter.[10]

Work under the act is short-term, often on the order of a few weeks per adult. Households with at least one member employed under the act during agricultural year 2009-10 report a mean of only 38 days of work and a median of 30 days for *all* members of the household

[8] Figures are from the official NREGA website nrega.nic.in.

[9] Authors' calculations based on the National Sample Survey Organization (NSS) Employment-Unemployment survey Round 66.

[10] Authors' calculations based on the NSS Employment-Unemployment survey Round 66.

during that year, which is well below the guaranteed 100 days. Within the study area as well as throughout India, work under the program is rationed (Dutta et al., 2012). During the agricultural year 2009-10, an estimated 19% of Indian households reported attempting to get work under the act without success.[11] The rationing rule is at the discretion of local officials: workers are actively recruited for work by village officials rather than applying for work (The World Bank, 2011). Finally, work is provided only to households who are registered in the village council (Gram Panchayat). Thus, workers cannot migrate to another village - let alone another state - to participate in the NREGA.

2.2 Survey

2.2.1 Sample Selection

Our analysis draws from a survey collected by John Papp with Diane Coffey and Dean Spears Coffey et al. (2015). Figure 3 shows the location of the 70 sample villages. The selection of sample villages proceeded in three steps. First, we selected one district in Rajasthan and three neighbouring districts, one in Gujarat and two in Madhya Pradesh. The survey location was chosen because previous studies in the area reported high rates of out-migration and poverty (Mosse et al., 2002), and because surveying along the border of the three states provided variation in state-level policies. Second, we matched villages in Rajasthan with villages across the border in Gujarat and Madhya Pradesh based on seven criteria: distance, fraction of Scheduled Castes (SC), fraction of Scheduled Tribes (ST), cultivated area, irrigated and non-irrigated cultivated area and population per cultivated area.[12] Finally, we selected the 25 best matches across along the Madhya Pradesh border and the 10 best matches along the Gujarat border to be part of the survey sample.[13] As Panel A of Table 1 shows, this procedure ensured that village pairs were well balanced along these dimensions.

The survey itself consisted of three modules: village, household, and adult modules.[14] The household module was completed by the household head or other knowledgeable member. One-on-one interviews were attempted with each adult aged 14 to 69 in each household. The analysis in this paper focuses mostly on those adults who completed the full one-on-one interviews. Appendix Table A.1 presents means of key variables for the subset of adults who answered the one-on-one interviews as well as all adults in surveyed households. Out of

[11] Author's calculations based on the NSS Employment-Unemployment Survey Round 66.

[12] Village characteristics used for matching were measured in the 2001 census, before the NREGA.

[13] The best matches were pairs with the lowest sum of squared distances over the seven criteria.

[14] In 69 of the 70 villages, a local village official answered questions about village-level services, amenities and labor market conditions. We do not use this data in the analysis.

2,722 adults aged 14-69, we were able to complete interviews with 2,224 (81.7%). Column 4 presents the difference in means between adults who completed the one-on-one interview and those who did not. The 498 adults that we were unable to survey are different from adults that were interviewed along a number of characteristics. Perhaps most strikingly, 40% of the adults that we were unable to survey were away from the village for work during all three seasons of the year compared with eight percent for the adults that we did interview. These migrants are also less likely to be affected by the NREGA: they are half as likely to have ever done NREGA work as other adults in the sample.[15]

To assess how the adults in our sample compare with the rural population in India, Column 5 in appendix Table A.1 presents means from the rural sample of the nationally representative NSS Employment-Unemployment Survey. Literacy rates are substantially lower in the study sample compared with India as a whole, reflecting the fact that the study area is a particularly poor area of rural India. The NSS asks only one question about short-term migration, which is whether an individual spent between 30 and 180 days away from the village for work within the past year. Based on this measure, adults in our sample are 28 percentage points more likely to be short-term migrants than adults in India as a whole. Part of this difference may be due to the fact that the survey instrument was specifically designed to pick up short-term migration, though most of the difference is more likely due to the fact that the sample is drawn from a high out-migration area. Column 6 in Table A.1 shows the short-term migration rate is 16% for the four districts chosen for the migration survey according to NSS, which is half the mean in sample villages (30%) but well above the all-India average (2%).

2.2.2 Seasons

The survey instrument was specifically designed to measure migration, cultivation, and participation in the NREGA, which are all highly seasonal. The survey was implemented at the end of the summer 2010, i.e. when most migrants come back for the start of the agricultural peak season. Surveyors asked retrospective questions to each household member about each activity separately for summer 2010, winter 2009-10, monsoon 2009, and summer 2009. Most respondents were surveyed between mid summer 2010 and early monsoon 2010, so that in many cases, summer 2010 was not yet complete at the survey date. As a result, when we refer to a variable computed over the past year, it corresponds to summer 2009, monsoon

[15] We can include adults who were not interviewed personally in the analysis by using information collected from the household head and check that our results are not affected. We choose not to use this information in our main specification to maximize precision of our estimates, but include it later as a robustness check.

2009, and winter 2009-10. Respondents were much more familiar with seasons than calendar months, and there is not an exact mapping from months to seasons. Summer is roughly mid-March through mid-July. The monsoon season is mid-July through mid-November, and winter is mid-November through mid-March.

2.2.3 Measuring Demand for NREGA Work

An important variable for the following analysis is whether an individual wanted to work more for the NREGA during a particular season. Specifically, the question is, "if more NREGA work were available during [season] would you work more?" for individuals who had worked for the NREGA. For individuals who did not work for the NREGA, we asked "did you want to work for the NREGA during [season]?" One should be skeptical that the answer to these questions truly indicates a person's willingness to work. Appendix Table A.2 shows that the correlations between the response to the resulting measure of demand and respondent characteristics are sensible: demand for NREGA is lower for adults with secondary education, and those who have a formal salaried job. Interestingly, adults who have migrated during the summer 2009 are more likely to say that they would have liked to do NREGA work during that season, which is consistent with the idea that the NREGA competes with seasonal migration. We also check the reasons given by respondents for why they did not work if they wanted to work and why they did not want to work if they reported not wanting to work. The closure of worksites and the inaction of village officials are the main reasons given by respondents who wanted more NREGA work while other work opportunities, studies, and sickness are the the main reasons given by respondents who did not want more NREGA work.

2.2.4 Migration Patterns

In order to assess the costs of migration, we require reliable information on what migrants do and how much they earn. Given the short-term nature of most migrant jobs, the same migrant might work for multiple employers for different wages and make multiple trips within the same season. For this reason, the survey instrument included questions about earnings, wages, and jobs for each trip within the past four seasons up to a maximum of four trips. Some migrants still might hold multiple jobs and therefore earn different wages within the same trip, but daily earnings and jobs characteristics are probably more similar within the same migration trip than within the same season. In total, this yields detailed observations for 2,749 trips taken by 1,125 adults. So that we do not overweight migrants who took more frequent, shorter trips relative to migrants who took less frequent, longer trips, we calculate the average across trips for each migrant for each season that the migrant was away, using trip duration as weight. Finally, we take into account the possibility that migrants do not always find work at destination by using earnings per day away, rather than earnings per day worked as our main measure of migration returns.[16] One important downside of asking respondents about their four most recent trips, is that we do not have detailed information on trips done in earlier seasons for people who migrated more than four times in the last year. In particular, for 200 adults who migrated in the summer 2009 (out of 768 in total), we do not know where they went, for how long, or how much they earned.

Columns 1 to 3 in Table 2 presents descriptive information about short-term migration trips based on the survey. As expected, migration is concentrated during the winter and the summer and is much lower during the peak agricultural season (from July to November). Short-term migrants travel relatively long distances (300km on average during the summer), and a large majority goes to urban areas and works in the construction sector.[17] Employer-employee relationships are often short-term: only 37% of migrants knew their employer or labor contractor before leaving the village. Living arrangements at destination are rudimentary, with 86% of migrants reporting having no formal shelter (often a bivouac on the work-site itself). Most migrants travel and work with family members, only 16% have migrated alone. Table 2 shows that migrants are close to full employment, they work on average six days per week spent at destination. Their average earnings per day away is Rs. 101, which means that their travel cost (Rs. 110) is recouped in a couple of days. Column 4 presents national averages from NSS data. Migration patterns are similar along the few dimensions measured in both surveys. The average rural short-term migrant in India as a whole is less likely to go to urban areas, and more likely to work in the manufacturing or mining sector than in the survey sample. As before, averages from NSS for the four districts of the survey sample are closer to the survey estimates (Column 5).

3 Program effect on migration

3.1 Descriptive statistics

Before providing causal evidence of the program effect on migration, we describe the correlation between demand for NREGA work, program participation and short-term migration in

[16]Appendix A describes the construction of the earnings measures in more detail.

[17]Figure A.1 in Appendix illustrates that migrants from the survey area travel across the country.

the survey data (Appendix Table A.3). Survey data shows that in our sample as in the rest of India NREGA work provision is highly seasonal, with 40% of all adults working for the NREGA in the summer, 0% during the monsoon and 6% only during the winter (Column 4 in Table A.3). It also confirms the high, unmet demand for NREGA work; 80% of all adults would have worked more for the NREGA during the summer if they were provided work. During the summer, when both migration and NREGA work coexist, we find that 12% of all adults both migrated and did NREGA work. Demand for NREGA work was also higher among migrants than for the population as a whole: 86% of migrants (30% of adults) declare they would have done more NREGA work. Furthermore, 8% of all adults declared they would have migrated during the summer if there had not been NREGA work. These results suggest that NREGA work reduced or could potentially reduce migration for 38% of adults.

Comparing Columns 1, 2 and 3 in Appendix Table A.3 reveals important differences across states. As explained in Section 2, the 70 sample villages were selected on each side of the border of the state of Rajasthan with two other states: Madhya Pradesh, and Gujarat. Table A.3 shows that the fraction of adults who worked for the NREGA during the summer 2009 was 50% in Rajasthan, 39% in Madhya Pradesh, and 10% in Gujarat. Even conditional on participation, NREGA workers received 31 days of work in Rajasthan on average, against 22 days in Madhya Pradesh and 25 days in Gujarat. Interestingly, the fraction of adults who reported wanting to work for the NREGA and the number of days of NREGA work they wanted were very similar across states, between 78% and 81%, and between 41 and 48 days, respectively. This suggests that in the sample as in the rest of India variation in NREGA employment provision were due to differences in political will and administrative capacity in implementing the scheme rather than differences in demand for work (Dutta et al., 2012).

Table A.3 also provides descriptive evidence that higher NREGA work provision is associated with lower migration. The proportion of adults who declare they stopped migrating because of NREGA in the summer increases from 3% in Gujarat to 8% in Madhya Pradesh and 10% in Rajasthan (Panel A). In the following sections, we use variation in NREGA employment provision across states and seasons to estimate the causal effect of the program on seasonal migration.

3.2 Empirical Strategy

In order to estimate the impact of the NREGA on days spent outside the village we exploit the variation in program implementation across states and compare Rajasthan with Gujarat and Madhya Pradesh. We also take advantage of the seasonality of public employment provision and compare the summer months, when most employment is provided, to the rest of the year. The estimating equation is:

$$Y_{is} = \alpha + \beta_0 Raj_i + \beta_1 Sum_s + \beta_3 Raj_i * Sum_s + \gamma \mathbf{X_i} + \varepsilon_{is} \quad (1)$$

where Y_{is} is the outcome for adult i in season s, Raj_i is a dummy variable equal to one if the adult lives in Rajasthan, Sum_s is a dummy variable equal to one for the summer season (mid-March to mid-July) and X_i are controls. The vector X_i includes all worker characteristics (gender, age, education, marital status, language skills), households characteristics (size, religion, caste, wealth), and village controls (population and connectivity) listed in Table 1, as well as village pair fixed effects.[18] Standard errors are clustered at the village level.

In order for β_3 to identify the impact of the NREGA, villages in Rajasthan need to be comparable with their match on the other side of the border in all respects other than NREGA implementation. Potential threats to our identification strategy include differences in socio-economic conditions or other state policies (infrastructures, education, health etc.). Table 1 presents sample means of village characteristics for village pairs in Rajasthan and Madhya Pradesh and village pairs in Rajasthan and Gujarat. Matching variables (Panel A) are balanced by construction. Other socio-economic characteristics, such as population size, age and household structure, literacy rate, fraction of households who depend on agriculture as their main source of income are also balanced across borders (Panel B, C and D). There are however significant differences in transportation and communication infrastructure. In particular, villages in Gujarat are more likely to get bus service, they are closer to towns, and have greater access to electricity and mobile phone networks. We check that our results are robust to including village characteristics in our analysis as controls, and to excluding village pairs with Gujarat.

3.3 Results

Table 3 presents our results on the causal effect of the program on migration. We first use days worked for the NREGA in each season as an outcome and estimate Equation 1. Column 1 confirms that across states, virtually no public employment was provided outside of the summer months. During the summer 2009, adults in Madhya Pradesh and Gujarat,

[18] We also estimate our specification including a dummy variable for whether the adult reported being willing to work more for the NREGA in this particular season and find similar results (not reported here).

worked about six days for the NREGA. The coefficient on the interaction of Rajasthan and summer suggests that in Rajasthan nine more days of public employment were provided. The estimated coefficients do not change at all after including controls and village pair fixed effects (Column 2). Panel B in Table 3 presents the estimates obtained without villages on the border of Gujarat and Rajasthan. Comparing villages on either side of the border between Rajasthan and Madhya Pradesh, adults in Rajasthan worked on average seven days more on NREGA worksites than adults in Madhya Pradesh.

Columns 3 and 4 in Table 3 repeat the same analysis with days spent outside the village for work as the dependent variable. Estimates from Panel A suggest that the average adult in Madhya Pradesh and Gujarat villages spent 11 days away for work during the monsoon and the winter 2009. Adults in Rajasthan villages spent a day less away for work, but the difference is not significant and changes sign once we include controls. By contrast, in the summer 2009 adults in Rajasthan villages spent five and a half fewer days on average working outside the village than their counterparts in Gujarat and Madhya Pradesh, who were away for 24 days on average. The estimated coefficients hardly change with the inclusion of controls and village pair fixed effects. As a robustness check, we estimate the same specification without the village pairs that include Gujarat villages. The magnitude of the effect increases to eight and a half days per adult (Column 3 Panel B). Taken together, our estimates suggest that one day of additional NREGA work reduces migration by 0.6 to 1.2 days.[19]

This effect is the combination of a reduction in the probability of migrating (extensive margin) and the length of migration trips conditional on migrating (intensive margin). Columns 5 and 6 of Table 3 present estimates of Equation 1 taking as the outcome a binary variable equal to one if the respondent migrated during the season. In Madhya Pradesh and Gujarat villages, 20% of adults migrated at some point between July 2009 and March 2010. The probability is exactly the same in Rajasthan villages. During the summer 2009, on average 39% adults migrated in Madhya Pradesh and Gujarat villages. The proportion of migrants was seven percentage points lower in Rajasthan villages and the difference is highly significant. When we compare only villages in Madhya Pradesh and Rajasthan (Panel B), we find that the probability of migrating during the summer was 11 percentage point lower in Rajasthan. The estimates are robust to the inclusion of controls and pair fixed effects.[20]

[19]We repeat the same analysis including adults who were not interviewed personally but about whom information was collected from the household head. The results, shown in Appendix Table A.4 are extremely similar. As discussed in Section 2.2 adults who were not interviewed personally were more likely to migrate in all seasons, and hence less likely to change their migration behavior in response to the NREGA.

[20]We find no significant differences in the number of trips made during the season between villages in Rajasthan and villages in Gujarat and Madhya Pradesh (results not shown).

The differences we observe in migration patterns between Rajasthan, Madhya Pradesh and Gujarat could be partly due to preexisting differences unrelated to the NREGA. The fact that we do not find any significant difference across states in migration during the monsoon and winter seasons, when the program is not implemented, gives some reassurance that migration patterns are not systematically different across states. We also compare the number of long-term migrants across-states, i.e. individuals who changed residence and left the household in the last five years, and find no significant differences (see Appendix Table A.7). Finally, the survey included retrospective questions about migration trips in previous years. Using non missing responses, we find no significant difference in migration levels in 2004 and 2005, i.e. before the NREGA was implemented (see appendix Figure A.2). Unfortunately, the fraction of respondents who forgot whether they migrated is high, about 22% for 2005 and 47% for 2004.

4 Estimating Migration Costs

4.1 Theoretical framework

In this section, we outline a theoretical framework to understand the impact of the program on migration decisions by rural workers, and use it to structurally estimate the flow cost of migration. Let us consider an individual living in a rural area. She splits her time T between work outside the village L_m and work in the village $(T - L_m)$. In-village earnings take the form $f(T - L_m)$ with $f(\cdot)$ increasing and concave. Leaving the village requires a fixed cost c_f and a variable cost c_v per unit of time spent outside the village. While outside the village, migrants earn w_m per day away. Time spent outside the village L_m maximizes:

$$\max_{L_m \in [0,T]} \mathcal{U} = f(T - L_m) + (w_m - c_v)L_m - c_f \mathbb{1}\{L_m > 0\}$$

For any interior solution $L_m > 0$, the optimal period of time spent migrating is L_m^* such that $f'(T - L_m^*) = w_m - c_v$. The model assumes that the utility function is linear in earnings and that there is no leisure choice. More generally, one could think of $f(T - L_m^*)$ as capturing utility from time spent in the village after the individual has optimally chosen work outside of the village L_m and leisure given a time constraint of T. Similarly, $(w_m - c_v)L_m - c_f \mathbb{1}\{L_m > 0\}$ captures utility from time spent outside the village.

Next, we consider what happens when L_g days of government work (NREGA work) are offered within the village at wage w_g. We assume L_g is small relative to the usual duration of migration trips ($L_g << L_m^*$) and fixed, i.e. workers may choose whether or not participate to the program, but not the number of days they work.[21] Under these assumptions the optimal migration duration remains L_m^*. In the survey, individuals were asked whether or not they would have wanted to do more NREGA work than they did. We interpret a positive answer to this question as indicating that for the respondent the marginal value of time is lower than the program wage w_g. For migrants, the marginal value of time is $f'(T - L_m^*)$, which is equal to the difference between the daily wage away w_m minus the flow cost of migration c_v. Formally, let M be a dummy variable equal to one when the individual migrates and G a dummy variable equal to one if the individual declares wanting more NREGA:

$$G = 1|_{M=1} \Leftrightarrow w_m - c_v < w_g \tag{2}$$

4.2 Estimation Strategy

We build on our model and use equation 2 to identify the variable cost of migration c_v for migrants. We assume that c_v follows a normal distribution:

$$c_v \sim \mathcal{N}(\mu_v, \sigma_v^2)$$

Under these assumptions the probability of wanting more work conditional on migrating is:

$$Pr(G = 1|_{M=1}) = 1 - \mathbf{\Phi}_{\mu_\mathbf{v},\sigma_\mathbf{v}}(w_m - w_g)$$

where $\mathbf{\Phi}_{\mu_\mathbf{v},\sigma_\mathbf{v}}$ denotes the c.d.f. of the normal distribution with mean μ_v and variance σ_v^2. The main identification assumption is that migrants who say that they want more work mean that they would have done NREGA work and still migrated, i.e. that we can interpret their answer purely on the intensive margin.[22] Under this assumption, we can estimate μ_v and σ_v by maximum likelihood:

$$\log L = \sum_{G_i=1} \ln\left(\Phi\left(\frac{w_m^i - \mu_c}{\sigma_c}\right) - \Phi\left(\frac{w_m^i - w_g^i - \mu_c}{\sigma_c}\right)\right) + \sum_{G_i=0} \ln\left(\Phi\left(\frac{w_m^i - w_g^i - \mu_c}{\sigma_c}\right)\right)$$

[21] These assumptions are consistent with the fact that demand for NREGA work is rationed, far below the mandated 100 days (see Section 2.1). During the summer 2009 less than 15% of adults who worked for the NREGA received more than 32 days, but more than 85% of adults who migrated were away for more than 32 days.

[22] This can be tested using information on how many days of NREGA work they say they would have wanted. We check that our results are robust to excluding migrants for which the desired number of NREGA days is higher than the number of days they migrated.

The estimation requires potential demand for work, migration earnings and NREGA earnings for each migrant during the same season. For all 768 migrants who were interviewed personally, we know whether they would have liked to do more NREGA work in the summer 2009. As discussed in Section 2.2, however, we do not observe migration earnings in the summer 2009 for the 200 migrants who took more than four trips in the last year. We predict their earnings per day away by regressing migration earnings of the remaining 568 migrants on migration earnings in other seasons and on worker and household controls. We also need to predict NREGA earnings for the 501 migrants who have not worked for the NREGA in the summer 2009. For this, we regress NREGA earnings of the 267 migrants who did NREGA work on program participation and earnings in other seasons, as well as on worker and household controls. Appendix Table A.5 presents the estimates. In both cases, the mean of predicted and observed earnings are virtually the same, which suggests that migrants for whom we do not observe migration or NREGA earnings are not systematically different from the others (see appendix A for more detail).

4.3 Results

Table A.6 in appendix presents earnings per day spent outside the village for migrants and per day worked for the NREGA for adults who worked outside of the village in the summer 2009.[23] For the average migrant, earnings outside of the village are 53% higher than earnings on NREGA work sites (Column 1). Columns 2 and 3 further split the sample of migrants into those who report wanting more NREGA work and those who report not wanting more NREGA work. As expected, the differential between daily earnings outside the village and NREGA earnings is much higher for migrants who do not want NREGA work (73%). But even for migrants who would have wanted to do NREGA work the difference in earnings is substantial: they would have earned 50% more per day outside of the village than per day worked on NREGA worksites. Of course, a majority of migrants did not actually work for the NREGA, so that these comparisons are based on predicted rather than actual earnings. As a check, the last column restricts the sample to adults who both worked outside the village and did NREGA work in the summer 2009. The pattern is very similar: earnings outside of the village are much higher (51%) than earnings from NREGA work.

Table 4 presents the estimated distribution of variable migration costs using the framework set out in the previous section. For the average migrant (Panel A), the flow utility cost per day away is 60 rupees which is 59% of the average daily earnings per day away from

[23]The construction of these variables is described in detail in Section 2.2 and Appendix A.

the village. Our estimation relies on the assumption that when migrants declare that they would have liked to do more NREGA work, they compare utility from one day away and one day working on the program. This rules out any consideration of fixed costs associated with migration (c_f in the model) or participation to the program. We test the robustness of our results in four ways. First, we restrict the sample to migrants for whom we actually observe migration earnings. The results in Column 2 of Table 4 are virtually unchanged. Second, we restrict the sample to migrants who have worked for the NREGA during the season, so that they have already paid any cost of participation. The results are again very similar (Column 3 of Table 4). Third, we restrict the sample to migrants who declare wanting a number of NREGA days lower than the number of days they were away, so that even if they had participated to the program as much as they wanted they would still have migrated (paid c_f). As Column 4 of Table 4 shows, the estimated flow cost of migration for these migrants is lower, but still about 45% of migration earnings. Finally, we restrict the sample to migrants who declared wanting a number of NREGA days higher than the total days in the season minus the number of days they spent migrating, so that they could not possibly have done as much NREGA work without migrating less. The estimated flow cost of migration is again lower, but still about 44% of migration earnings (Column 5 of Table 4).

These structural estimates suggest that the flow cost of migration needs to be very high to explain that many migrants are ready to forgo higher wages at destination and do NREGA work in the village. In the following section, we assess the relative importance of two possible sources of migration costs: higher costs of living at destination, and uncertainty about earnings from migration. We then discuss other possible factors.

5 Explaining Migration Costs

5.1 Differences in living costs

Living in urban areas is more expensive than living in the village, and migrants may need to pay for goods they would get for free or cheaply at home. Since our estimation relies on nominal comparisons, any difference in living costs will enter the flow cost of migration. Existing evidence on urban-rural wage gaps in India suggests that adjusting for living costs may be important. Using NSS 2009-10 Employment Unemployment surveys and state poverty lines as deflators, Hnatkovska and Lahiri (2013) show that urban-rural real wage gaps are zero, or even negative at the bottom of the distribution of wages. Deflators used for urban residents may not be however appropriate for short-term migrants if their respective consumption baskets are very different. As we saw from Table 2, 86% of migrants in the summer 2009 had no formal shelter but bivouacked on the worksite. Most of the remaining 14% stayed with friends and family. This suggests that very few migrants actually paid for housing, which is an important part of living costs of urban residents. Similarly, expenditures on education, health and durable goods are likely made at home and not at destination. Food is perhaps the only type of expenditures short-term migrants need to make at higher prices in urban areas.

In order to evaluate what fraction of the estimated flow cost of migration can be explained by differences in living costs, we consider three possible deflators for migration earnings, We first follow Hnatkovska and Lahiri (2013) and compute the ratio of the urban poverty line in the state of destination to the average rural poverty line in the three states of origin: Gujarat, Madhya Pradesh, and Rajasthan (Planning Commission, 2009). Let P_r denote the poverty line for households in rural areas of the states of origin and P_u the urban poverty line of the states of destination. The first deflator is simply:

$$D_1 = \frac{P_u}{P_r}$$

This deflator is only valid if seasonal migrants have the same consumption basket as poor urban residents. Since migrants expenditures at destination do not include housing, education, health and durable goods, they should be excluded from the deflator. We next use NSS Employment Unemployment Survey to estimate the share of non-durable expenditures in urban and rural areas of each state for households whose per capita expenditures are within 5% of the poverty line. Let P_r and S_r^1 (resp P_u and S_u^1) denote the poverty line and the share of non-durable expenditures for households at the poverty line in rural (resp. urban) areas. The second deflator is :

$$D_2 = \frac{P_u * S_u^1 + P_r * (1 - S_r^1)}{P_r}$$

Since we do not know in detail the actual consumption basket of migrants at destination but presume that it is mostly composed of food items, we construct a third deflator, which only includes food. We again use NSS Employment Unemployment Survey to estimate food shares in urban and rural areas for households whose per capita expenditures are within 5% of the poverty line. Let P_r and S_r^2 (resp P_u and S_u^2) denote the poverty line and the share of food expenditures for households at the poverty line in rural (resp. urban) areas. The third deflator is:

$$D_3 = \frac{P_u * S_u^2 + P_r * (1 - S_r^2)}{P_r}$$

As expected given the difference in consumption baskets between rural and urban households, the first deflator is higher than the second, which is higher than the third. For the migrants in our sample, the first deflator is equal to 1.3 (sd 0.12), the second to 1.13 (sd 0.09) and the third to 1.04 (sd 0.04).

We implement our estimation of migration costs using these three deflators. The results are presented in Table 5. Column 1 reports the same estimates as in Table 4 above. Since we can only consider the appropriate deflator when the destination is known, we first report the estimates when we restrict the sample to migrants whose destination we could locate. As Column 2 shows, the results are virtually identical. In Column 3, we estimate migration costs assuming that when they are at destination, migrants spend their income as urban residents do. As expected, estimated migration costs are lower: only about 34% of migration earnings, which is 40% lower than the initial estimate. However, as Column 4 shows, once we exclude durable expenditures from the deflator, the estimate of migration costs is substantially higher, about 47% of migration earnings (18% lower than the initial estimate). Finally, when we consider only food expenditures, the estimated migration cost is equal to 53% of migration earnings, only 7% lower than the estimate without deflating (Column 5). In the absence of detailed consumption data at origin and destination for migrants, these figures provide suggestive evidence that differences in living costs between destination and origin may only explain between 7 and 18% of the estimated flow cost of migration.

5.2 Risk in migration earnings

Another source of utility cost associated with migration is income risk: migrants may not find work at destination or may have to work for lower wages than expected. Bryan et al. (2014) argue the risk of failed migration is an important barrier to seasonal migration during the hunger season in Bangladesh. They also find evidence of individual learning on migration risk, but little evidence of peer effects, which suggests that risk is idiosynchratic. In contrast with Bryan et al. (2014), individual learning has already taken place in the context we study: 71% of short term migrants in the Summer 2010 report having migrated in the Summer 2009, and only 8.6% have never migrated before. We can use information on migration earnings from repeated trips to estimate the idiosynchratic risk migrants are exposed to. Earnings are defined as earnings per day away, which allows us to account for both employment and wage risk. We restrict the analysis to 435 migrants for whom we have earnings per day away for both summers 2009 and 2010. Their average daily earnings in the Summer 2009 are Rs. 100. We then run a regression of earnings per season on season and migrant fixed effects and estimate the standard deviation of the residuals. The estimated standard deviation, which is our measure of income risk, is Rs. 25.[24]

We next use the estimated mean and variance of migration earnings to compute the relative risk premium, i.e. the amount one would need to guarantee to migrants at home to make them indifferent between migrating and not migrating, expressed as a fraction of daily migration earnings. If we assume migrants utility has constant relative risk aversion ρ then the relative risk premium (RPP) can be approximated as a simple function of the mean $\widehat{\mu}$ and standard deviation $\widehat{\sigma}$ of daily migration earnings:

$$RRP \approx \frac{\rho \widehat{\sigma}^2}{2\widehat{\mu}^2} \approx \frac{\rho}{32}$$

Table 6 presents the results of the calibration. Even assuming a very high level of relative risk aversion $\rho = 5$ the relative risk premium is only .16, i.e. a quarter of the estimated flow cost of migration. For more moderate levels of risk aversion $\rho \approx 1.5$, which Bryan et al. (2014) find match the evidence on migration decisions relatively well, the relative risk premium is slightly below .05, or 8% of our estimate of the flow cost of migration. As an alternative calibration, we use Binswanger (1980) results on risk aversion of Indian farmers. Binswanger (1980) uses lotteries to elicit Z, the increase in expected returns needed to compensate for an increase in the standard deviation of gains, and finds that for the majority of farmers it ranges from 0.33 to 0.66. We can use these figures to obtain a relative risk premium ($RRP = Z\frac{\sigma}{\mu}$) which ranges from .08 to .16. According to these estimates, income risk explains between 13 and 27% of the estimated flow cost of migration.

5.3 Non-monetary costs of migration

Taken together, our findings suggest that under reasonable assumptions differences in living costs and migration risk can account for up to only a half of the estimated utility cost of migration. The disutility cost of bivouacking for months in the city, leaving family behind is presumably also important, but harder to quantify. In order to provide evidence on this non-

[24] Alternatively, we can use cross-sectional variation only and estimate idiosynchratic risk as the standard deviation of the residuals of a regression of daily migration earnings in the Summer 2009 on workers characteristics, migration history and village fixed effects. The estimated standard deviation is Rs. 29, close to, but higher than our preferred estimate.

monetary dimension of migration costs, we regress the demand for NREGA work on migrant and trip characteristics, controlling for migration and NREGA earnings. Specifically, let D_{id} be a dummy variable set equal to one if individual i who migrated to destination d in the summer 2009 declared that she would have liked to do more NREGA work in that season. As before, let w_m^i and w_g^i denote migration and NREGA earnings respectively. Let $\mathbf{X_i}$ denote a vector of migrant characteristics, including worker and household controls from Table 1. Let $\mathbf{Z_d}$ denote a vector of trip characteristics, including those from Table 2, as well as crime and pollution levels at destination (see Appendix A for more detail). Let μ_S denote state fixed effects. We estimate the following regression through probit, with standard errors clustered at the village level:

$$D_{id} = \alpha_m \log(w_m^i) + \alpha_g \log(w_g^i) + \beta \mathbf{X_i} + \delta \mathbf{Z_d} + \mu_S + \varepsilon_{id}$$

Table 7 presents the probit estimates (marginal effects at the mean). As expected, we find that migrants who had higher earnings were less likely to want NREGA work, which is consistent with the evidence presented above. NREGA earnings, which show little variation across individuals, have no significant effect on demand for NREGA work. Two worker characteristics have significant effects: education and age. The relationship between NREGA demand and education is non-linear: migrants with primary education were more likely to want NREGA work than workers with no education, but migrants with secondary education were less likely to want NREGA work. This may be due to the fact that the non-monetary costs of migration are more important than the monetary gains for more educated workers, but that workers who have the highest level of education have better employment opportunities than the NREGA (as appendix Table A.2 shows). The disutility of migration also increases with age: migrants above 30 are more likely to want NREGA work. Only one household characteristic has a significant effect: the disutility of migration was higher for migrants from households who have electricity at home, which may make time in the village more productive / attractive. Finally, turning to the effect of trip and destination characteristics we find no significant effect of prices at destination on demand for NREGA work (the estimate is positive and large but noisy). Since 86% of migrants slept on the worksite (see Table 2), there is not much variation to study the role of housing conditions. We find mixed evidence on the role of destination amenities at destination do matter: the utility cost of migration was lower among migrants who went to an urban area, but was higher among those who went to a destination where crime levels were relatively high. The level of air pollution does not seem to influence migrant choices, which is perhaps due to the fact that construction workers are exposed to high level of particle matter on site anyway.

6 Conclusion

This paper provides new evidence on the costs and benefits of migration in developing countries. We study seasonal migration, which provides a unique opportunity to observe the same worker doing similar work in the village and in the city in the same season. Our analysis relies on original survey data from a high out-migration area in three Indian states and proceeds in two steps. First, we show that when employment is available on local public works, rural workers shorten their migration trips or stop migrating altogether. This is despite the fact that migrants' earnings per day outside of the village are much higher than daily earnings from the program. Second, we use a simple structural model and individual information on migration and public works earnings to quantify the utility cost of migration implied by the preference of a majority of migrants for public works. We estimate that the flow cost of migration needs to be as high as 60% of daily earnings away from the village. In the last part of the paper, we attempt to quantify the different components of this cost. Using destination-specific deflators and appropriate consumption baskets, we show that higher living costs may only explain up to 18% of the cost of migration. We also measure income risk as variation in migration earnings across repeated migration spells for the same migrant, and find that even assuming high levels of risk aversion, income risk can only explain up to 27% of migration costs. The remaining 55% likely reflect non-monetary costs of harsh living and working conditions in the city and the non-monetary value of staying in the village. We show that these costs are higher for older migrants, for migrants who come from households with electricity at home, and migrants who go to areas where crime levels are higher.

Our results provide a useful complement to Bryan et al. (2014) experimental findings on seasonal migration in Bangladesh. Bryan et al. (2014) find that a small transport subsidy durably increases migration to the city. They argue that net benefits of short-term migration are large, but that rural workers lack information about urban employment opportunities and / or are too risk averse to migrate. By contrast, in the context of our study, workers are well informed of migration opportunities, but decide to stay back when employment is available locally, even for a much lower pay. We show that income risk is only part of the explanation. Hence, while rural workers may reap large monetary gains from migrating temporarily to the city, they also incur sizeable costs, many of which are non-monetary. In fact, in a recent re-evaluation of the initial Bangladesh experiment, Lagakos et al. (2018)

also argue that the welfare gains from migration subsidies may be limited by a large non-monetary cost of migration.

Our findings have important implications for development policy. On the one hand, many governments consider that migration has undesirable effects for the migrants themselves, for their communities of origin or their city (or country) of destination, and promote development at origin as an alternative to migration. Offering an "alternative to migration" was one of the motivation for the NREGA legislation (Ashish and Bhatia, 2009). In a different context, the new European Fund for Sustainable Development's main objective is to "tackle the root causes of migration" from Africa (European Parliament, 2017). Our results suggest that policies aimed at reducing migration flows do not need to fully compensate workers for the loss in potential migration earnings to convince them to stay at home. On the other hand, economists tend to argue that governments should in fact encourage mobility to urban areas, which would improve the allocation of labor in the economy (Gollin et al., 2014; Kraay and McKenzie, 2014; Bryan and Morten, 2015). Our results suggest that improving working and living conditions for migrants in urban areas may go a long way towards this aim.

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Figure 1: Cross-state variation in public employment provision

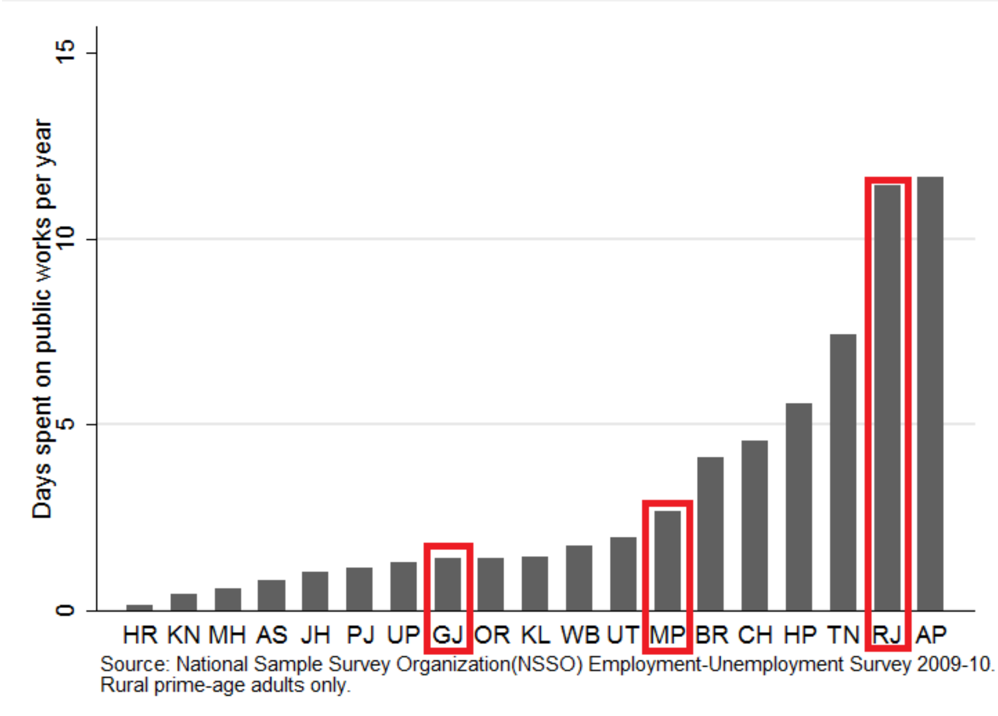

Figure 2: Seasonality of public employment provision

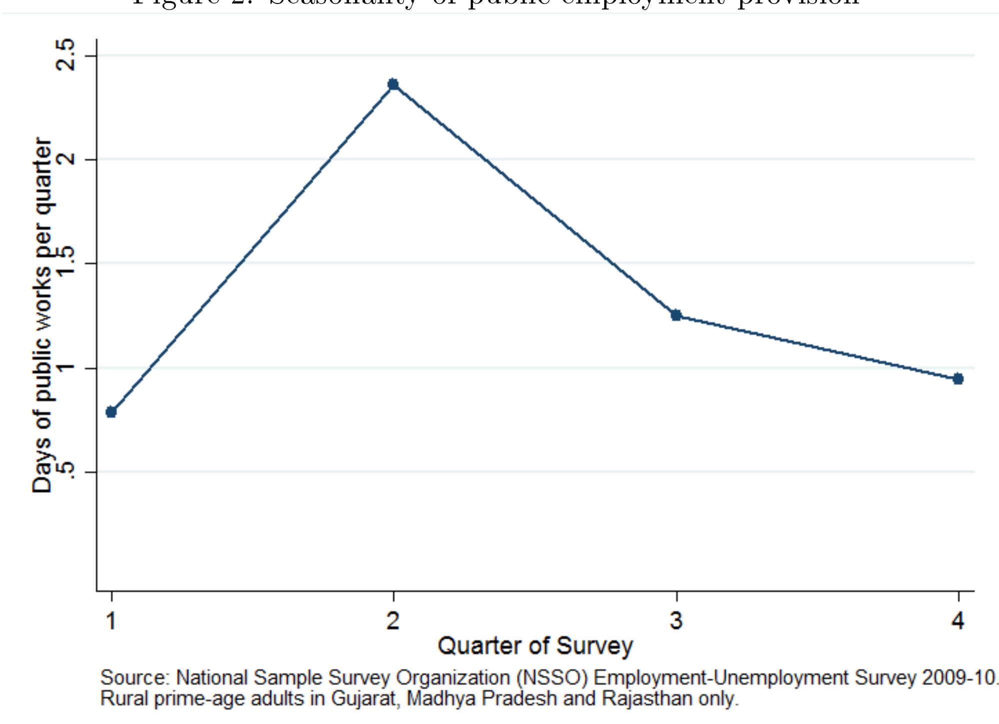

Figure 3: Seasonal out-migration rates in India and in the survey sample

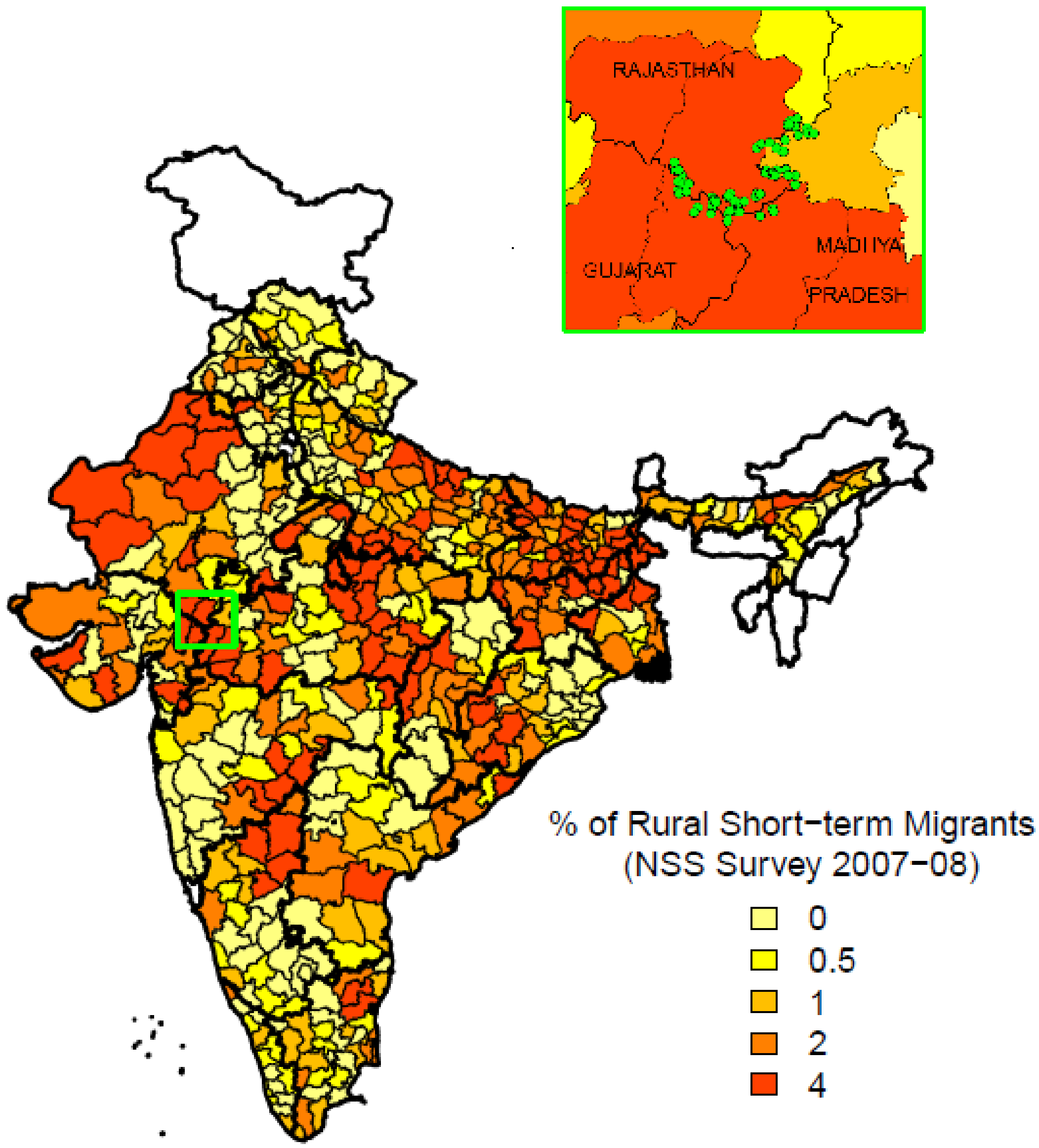

Table 1: Village Characteristics

	MP-RJ Pairs			GJ-RJ Pairs		
	RJ	MP	St. Diff.	RJ	GJ	St. Diff.
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Matching variables						
Population Share Scheduled Castes	0%	1%	0.09	1%	0%	0.53
Population Share Scheduled Tribes	96%	96%	0.01	98%	99%	0.43
Total culturable land	161	161	0.00	250	235	0.09
% culturable land irrigated	25%	25%	0.01	31%	27%	0.20
% culturable land non irrigated	59%	59%	0.02	57%	50%	0.30
Population per ha of culturable land	3.5	3.5	0.00	5.7	5.6	0.01
Panel B: Village controls						
Total Population	755	802	0.09	1815	1642	0.16
% Population Literate	37%	31%	0.48	39%	46%	0.94
Approach with paved road?	84%	76%	0.20	100%	100%	0.00
Bus Service?	0.28	0.24	0.09	0.30	1.00	1.43
Post and telecommunication facility?	0.08	0.12	0.13	0.40	0.10	0.68
Distance to Town (km)	26.20	38.04	0.68	43.40	16.60	1.20
Panel C: Household controls						
Number of Adults	4.69	4.85	0.18	4.46	5.58	1.01
Number of Children (below 12)	2.87	3.09	0.26	2.62	2.85	0.27
% Hindu	91%	80%	0.84	88%	77%	0.70
% Scheduled Tribes	89%	91%	0.07	85%	92%	0.29
% HH with dirt floor	91%	96%	0.41	81%	84%	0.16
% HH with cell phone	35%	33%	0.09	33%	55%	0.99
% HH with electricity	23%	33%	0.38	22%	57%	0.99
% HH whose main income source is farming	0.57	0.55	0.09	0.42	0.42	0.00
Panel D: Worker controls						
% Female	53%	53%	0.08	55%	50%	0.81
% Primary Education	16%	11%	0.73	11%	11%	0.06
% Education Beyond Primary	15%	10%	0.55	17%	37%	1.25
% Age between 30 and 45	28%	25%	0.30	25%	29%	0.38
% Age higher than 45	27%	31%	0.47	28%	30%	0.22
% Married	72%	76%	0.42	72%	72%	0.07
% Speaks Gujarati	5%	7%	0.21	11%	100%	1.89
% Speaks Hindi	35%	40%	0.24	26%	26%	0.01
Number of villages	25	25		10	10	

Matching variables are from the Census 2001. Village characteristics are from the Census 2011, household and worker characteristics are from the 2010 survey. The following acronyms are used for state names: RJ for Rajasthan, MP for Madhya Pradesh and GJ for Gujarat. Differences are normalized, i.e. divided by the standard deviation of the covariate in the sample. The literature considers a difference of more than 0.25 standard deviations as substantial (Imbens and Wooldridge 2009). All village, household and worker characteristics listed in this table are included as control in our main specification.

Table 2: Migration patterns

	Own survey			NSS 2007-08	
	Summer 2009	Monsoon 2009	Winter 2009-10	All India	Sample districts
	(1)	(2)	(3)	(4)	(5)
Migrated?	35%	10%	29%	3%	16%
Observations (whole sample)	2224	2224	2224	188324	1937
Migrant is female	40%	33%	43%	14%	32%
Migrated with household member	71%	63%	74%	42%	81%
Destination is in same state	17%	27%	24%	53%	82%
Destination is urban	84%	88%	73%	68%	71%
Worked in construction	70%	70%	56%	42%	69%
Distance (km)	300	445	286	-	-
Transportation cost (Rs)	116	144	107	-	-
Duration (days)	54	52	49	-	-
Found employer after leaving	63%	64%	54%	-	-
No formal shelter in destination	86%	85%	83%	-	-
Days worked per week spent at destination	6.06	5.95	6.10	-	-
Earnings per day worked at destination	118	127	123	-	-
Earnings per day spent at destination	101	107	109		
Observations (migrants only)	768	218	646	13411	327

Notes: Columns 1 to 3 present means based on the migration survey described in Section 2. The unit of observation is a prime-age adult. Each column restricts the sample to responses for a particular season. Seasons are defined as follows: summer from April to June, monsoon from July to November, winter from December to March. Columns 4 and 5 present means based on the National Sample Survey (NSS). In Column 4 the sample includes all rural adults. In Column 5 the sample is restricted to adults living in the four districts of the migration survey sample. Information on distance, migration duration, transportation cost, job search and accommodation at destination is not collected by the NSS.

Table 3: Effect of NREGA on Seasonal Migration

	NREGA Days		Days away		Any migration	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: All village pairs						
Rajasthan	-0.117	-0.388	-1.177	1.236	-0.0114	0.0201
	(0.183)	(0.419)	(1.671)	(1.266)	(0.0232)	(0.0163)
Summer (March-July)	5.982***	5.982***	13.30***	13.30***	0.187***	0.187***
	(0.802)	(0.806)	(1.746)	(1.753)	(0.0209)	(0.0210)
Rajasthan x Summer	8.990***	8.990***	-5.503**	-5.503**	-0.0703**	-0.0703**
	(1.128)	(1.133)	(2.203)	(2.213)	(0.0268)	(0.0269)
Observations	6,588	6,588	6,588	6,588	6,588	6,588
Control Mean	.67	.67	10.69	10.69	.2	.2
Panel B: Excluding pairs with Gujarat						
Rajasthan	-0.231	0.0319	-0.381	-0.534	-0.000557	0.00825
	(0.220)	(0.452)	(1.827)	(1.462)	(0.0256)	(0.0197)
Summer (March-July)	7.606***	7.606***	17.24***	17.24***	0.233***	0.233***
	(0.895)	(0.900)	(1.918)	(1.927)	(0.0226)	(0.0228)
Rajasthan x Summer	7.408***	7.408***	-8.640***	-8.640***	-0.107***	-0.107***
	(1.281)	(1.288)	(2.570)	(2.583)	(0.0301)	(0.0303)
Observations	4,677	4,677	4,677	4,677	4,677	4,677
Control Mean	.85	.85	8.77	8.77	.18	.18
Worker Controls	No	Yes	No	Yes	No	Yes
Village Pair Fixed Effect	No	Yes	No	Yes	No	Yes

The unit of observation is an adult in a given season. Results in Panel B are based on pairs of villages in Madhya Pradesh and Rajasthan only. Column 1 and 2 present results from a regression of days spent working on the NREGA during a particular season on a set of explanatory variables. In Column 3 and 4 the outcome is the number of days spent away for work. In Column 5 and 6 the outcome is a binary variable equal to one if the adult spent some time away for work during a particular season. Rajasthan is a dummy for whether the adult lives within a village in Rajasthan. Summer is a dummy for the summer months (mid-March to mid-July). Control Mean is the mean of the outcome variable in villages which are not in Rajasthan outside of the summer months. Standard errors are clustered at the village-level. ***, ** and * indicate significance at the 1, 5 and 10 percent level.

Table 4: Migration Cost Estimates

	All	Non-missing migration Earnings	Did NREGA work during the season	Days away > NREGA days wanted	NREGA days wanted > Days in the village
	(1)	(2)	(3)	(4)	(5)
Mean Migration Cost	60.0	60.3	64.9	47.0	47.3
	[54.8,65.2]	[54.9,66.3]	[58.1,72]	[39.1,55.3]	[37.2,57.5]
Standard Deviation	36.8	40.5	33.9	39.7	40.4
	[33.2,41.4]	[35.9,45.3]	[27.4,41.2]	[34.9,49.5]	[35.5,52.4]
Daily Migration Earnings	102.5	103.5	104.5	105.5	106.5
Cost as % of Earnings	58.6%	58.3%	62.1%	44.6%	44.4%
Observations	768	568	267	343	350

The unit of observation is an adult. The first and second rows present estimates of the mean and standard deviation of the distribution of migration costs per day spent outside the village. Confidence intervals are computed by bootstrap clustered at the village level. Column 1 uses the full sample of adults who left the village during the summer 2009. Column 2 includes only migrants for whom migration earnings are measured for that season. Column 3 includes only migrants who have done NREGA work during the summer 2009. Column 4 includes only migrants who report wanting less days of NREGA work than the number of days they were away. Column 5 includes only migrants who report wanting more NREGA work days than the days they spent in the village during the summer 2009.

Table 5: Migration Cost Estimates taking Living Costs into Account

	Nominal (all migrants)	Nominal (destination is known)	Deflated (including all expenditures)	Deflated (excluding housing and school fees)	Deflated (food expenditures only)
	(1)	(2)	(3)	(4)	(5)
Mean Migration Cost	60.0	59.9	36.0	49.0	56.1
	[54.7,65.6]	[53.9,65.8]	[30.9,41.4]	[43.7,55.1]	[50.5,61.5]
Standard Deviation	36.8	39.1	30.8	35.1	37.3
	[33.5,41.2]	[34,43.7]	[27.6,34.8]	[31.5,39.1]	[33.5,41.6]
Daily Migration Earnings	102.5	103.5	104.5	105.5	106.5
Costs as % of Earnings	58.6%	57.8%	34.4%	46.5%	52.6%
Observations	768	592	592	592	592

The unit of observation is an adult. The first and second rows present estimates of the mean and standard deviation of the distribution of migration costs per day spent outside the village. Confidence intervals are computed by bootstrap clustered at the village level. In column 1, the sample is composed of all adults who left the village during the summer 2009. In columns 2 to 4 it only includes migrants whose destination is known. In column 3 migration earnings are deflated using the ratio between the urban poverty line of the state of destination and the average rural poverty line in Gujarat, Madhya Pradesh and Rajasthan. In column 4 the ratio of poverty lines is applied only to an adjusted basket, which excludes housing expenditures and school fees. In column 5 it is only applied to food expenditures.

Table 6: Risk Premium Calibration

Risk Aversion Parameter	Risk Premium (% of Migration Earnings)
Panel A: Binswanger (1980)'s Z	
0.33	8%
0.5	12%
0.66	16%
0.8	20%
Panel B: Constant Relative Risk Aversion	
1	3%
2	6%
3	9%
4	12%
5	16%

This table displays results of a calibration of the implied risk premium (as a percentage of migration earnings) given the standard deviation of migration earnings and a risk aversion parameter. The standard deviation is estimated as the variation in earnings for the same individual migrating in the same season (March to July) across two consecutive years (2009 and 2010). In panel A the risk aversion parameter is the ratio of changes in expected earnings divided by changes in the standard deviation of earnings (Z). Based on experimental games with Indian farmers, Binswanger (1980) finds that less than 2.5% of respondents have Z higher than 0.8. In panel B the risk aversion parameter is a standard risk aversion, assuming Constant Relative Risk Aversion (CRRA) utility.

Table 7: Determinants of Migration Costs

	Want more NREGA work?	
	Coefficient	Standard Error
Log Migration Wage	-0.0836**	(0.0349)
Log NREGA Wage	-0.0478	(0.0496)
Female	-0.0125	(0.0224)
Primary education	0.0511***	(0.0175)
Education beyond primary	-0.159**	(0.0695)
Age 30 to 45	0.0551***	(0.0175)
Age higher than 45	0.0279	(0.0350)
Married	0.00101	(0.0263)
Speaks Gujarati	-0.0182	(0.0408)
Speaks Hindi	-0.0243	(0.0354)
Number of adults	0.00941	(0.00575)
Number of Children (below 12)	-0.00567	(0.00516)
Hindu	0.00586	(0.0362)
Scheduled Tribes	0.0813	(0.0497)
HH has dirt floor	-0.0162	(0.0281)
HH has cell phone	-0.0323	(0.0211)
HH has electricity	0.0725***	(0.0230)
HH main income source is farming	0.0247	(0.0214)
Log Destination Deflator	0.162	(0.231)
Migrated with Household	-0.0159	(0.0227)
Destination is in same state	0.0295	(0.0289)
Destination is urban	-0.0693***	(0.0206)
Worked in construction	0.0107	(0.0275)
Found employer after leaving	0.0221	(0.0247)
No formal shelter at destination	-0.0142	(0.0308)
Total crime per 1000	0.198**	(0.0804)
Pollution SPM µg per m3	-0.0447	(0.0428)
Observations	592	
State of Origin FE	Yes	

The unit of observation is an adult. The sample includes only adults who were interviewed personally and migrated in the summer 2009. We report marginal effects at the mean from a separate probit estimation. The outcome is a dummy variable equal to one if the respondent said they would have liked to do more NREGA work during the summer 2009. Worker controls and Household controls are described in Table 1. Trip characteristics are described in Table 2. The city deflator is the ratio of the urban poverty line in the state of destination to the average of rural poverty lines in Rajasthan, Madhya Pradesh and Gujarat. Crime per 1000 is computed using the National Crime Records Bureau report in the state of destination for 2009. Pollution is measured as Suspended Particle Matter per cubic meter, which is reported at the city level by the Central Pollution Control Board for the year 2010. Standard errors are clustered at the village-level. ***, ** and * indicate significance at the 1, 5 and 10 percent level.

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A Appendix

A.1 Construction of Earnings Variables

Migration Earnings The survey instrument included questions about the frequency of payment and the typical amount per pay period. In most cases (74%), respondents were paid daily and in these cases we used the typical daily payment as earnings per day worked. We also asked respondents how many days per week they typically worked. Respondents worked on average six days per week and the median respondent worked six days. For respondents who were paid weekly, fortnightly, or monthly, we used the reported payment adjusted by the typical number of days per week worked. For example, a migrant paid 800 rupees weekly and working six days per week earns $800/6 = 133$ rupees per day worked. For migrants that were paid irregularly or in one lump sum at the end of work, we used the total earnings from the trip divided by the number of days worked. For migrants with missing values of days worked per week, we assumed they worked six days. Five percent of respondents received payment in-kind for their work, being paid in wheat for example. We leave these daily earnings observations as missing. For respondents with non-missing total earnings (62%), earnings per day away was computed using total earnings divided by days away. For respondents with missing total earnings, we used earnings per day worked adjusted downwards using days worked per week away.

As discussed in Section 2.2, the survey recorded detailed information on the last four trips only. Hence for adults who migrated in the summer 2009 but took more than four trips afterward, we did not record information for any of the trips taken during summer 2009. Out of 768 migrants, we have non-missing earnings for 593 migrants (77%). For migrants with missing earnings, we construct linear predictions by projecting summer 2009 earnings onto migration earnings in the following seasons (monsoon 2009, winter 2009 and summer 2010), individual and household controls (the list of controls is the same as in Panel C and D of Table 1. The regression coefficients are shown in appendix Table A.5. The mean of the observed and the predicted migration earnings are Rs. 101 and Rs. 102 respectively, which provides reassurance that the migrants with missing earnings are very similar to the other migrants in terms of observable characteristics.

NREGA Earnings Out of the 895 adults who worked for the NREGA during summer 2009, 32 (3.6%) report not having been paid in full at the time of the survey. Assuming a wage of zero for those who were not paid yields a wage of 64.4 rupees per day compared with 67 for only those who were paid. For our estimation of migration costs, we need a measure of daily earnings on NREGA that non-NREGA participants would expect to receive. For this, we restrict our sample to the 238 adults who both migrated and did NREGA work in the summer 2009 and we regress NREGA earnings on NREGA daily earnings for the following season, individual and worker controls (see Panel C and D in Table 1). The regression estimates are shown in appendix Table A.5. Interestingly, none of the predictors except summer 2010 NREGA daily earnings are statistically significant, suggesting that the NREGA wage does not vary with productivity or observable characteristics. The R-square of the regression is low, about 14%. In contrast, the R-square for the prediction of migration earnings is 27%. We use these estimates to predict NREGA earnings for migrants who did not participate to the program in the summer 2009. Again, mean predicted earnings are extremely close to observed earnings, Rs. 65 and Rs. 66 respectively.

A.2 Destination Characteristics

In order to better understand the determinants of migrants' demand or NREGA work, we use several sources of information on their destination.

Poverty lines First, we use poverty lines from (Planning Commission, 2009) to compute deflators of migration earnings. Specifically, we compute the ratio of the urban poverty line in the state of destination divided by the average of the rural poverty line in the three sample states (Rajasthan, Madhya Pradesh, Gujarat).

Crime Second, we use information on total crime per 1000 inhabitants in the state of destination in 2009 from the National Crime Records Bureau. We thank Nishith Prakash for sharing the data (Prakash et al., 2014).

Pollution Third, we use an index of urban air pollution at the state level in 2010, Suspended Particle Matter per cubic meter reported by the Central Pollution Control Board. We thank Anant Sudarshan for sharing the data (Greenstone et al., 2015).

Figure A.1: Destinations of migrants from the survey sample in the summer 2009

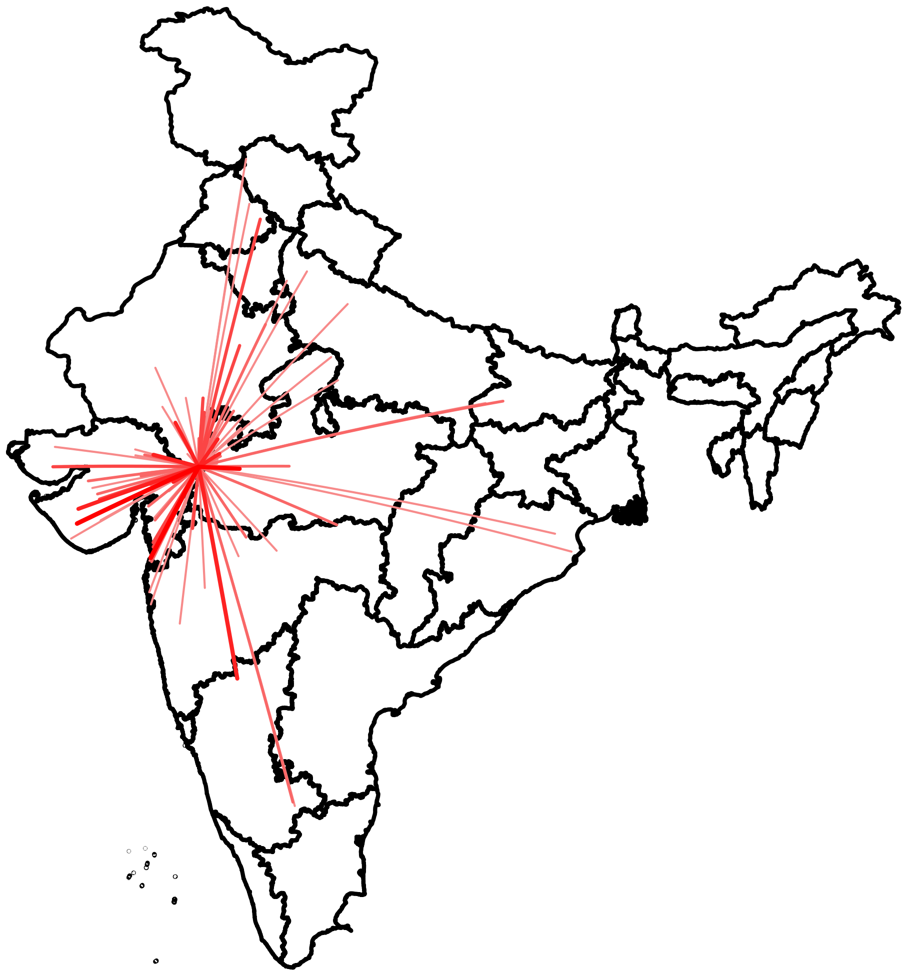

Figure A.2: Differences in seasonal migration across states using retrospective questions

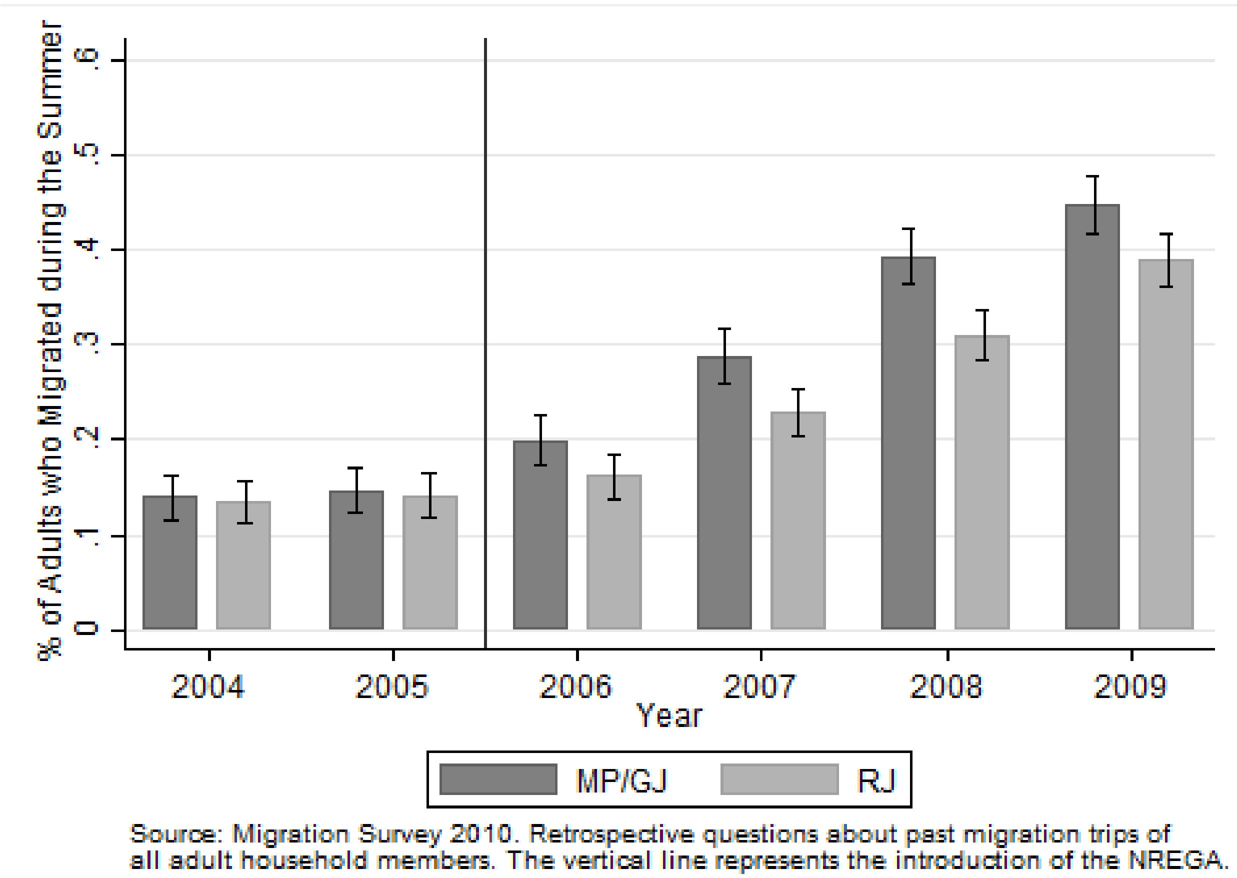

Table A.1: Migration Survey Sample

	Own Survey				NSS Survey 2007-08	
	All Adults	Full Adult Survey Completed	Adult Survey not Completed	Difference (3) - (2)	All Adults (India)	All Adults (Sample Districts)
	(1)	(2)	(3)	(4)	(5)	(5)
Female	0.511	0.525	0.448	-0.077	0.499	0.492
	(0.0056)	(0.0166)	(0.0067)	(0.019)	(0.0011)	(0.0076)
Married	0.704	0.729	0.594	-0.134	0.720	0.753
	(0.0091)	(0.021)	(0.0105)	(0.0233)	(0.0019)	(0.0185)
Illiterate	0.672	0.690	0.593	-0.097	0.372	0.491
	(0.0187)	(0.0327)	(0.019)	(0.03)	(0.003)	(0.0313)
Scheduled Tribe	0.897	0.894	0.910	0.016	0.106	0.660
	(0.0272)	(0.0278)	(0.0287)	(0.0225)	(0.0033)	(0.0601)
Age	32.8	34.1	27.0	-7.11	32.7	31.6
	(0.248)	(0.484)	(0.301)	(0.592)	(0.038)	(0.3508)
Spent 2-330 days away for work	0.433	0.422	0.482	0.060	--	--
	(0.0179)	(0.0394)	(0.0187)	(0.0412)		
Migrated for Work all Three Seasons	0.119	0.080	0.295	0.215	--	--
	(0.011)	(0.0318)	(0.0101)	(0.0324)		
Ever Worked for NREGA	0.528	0.581	0.291	-0.290	--	--
	(0.0253)	(0.0354)	(0.0259)	(0.0332)		
Spent 30-180 days away for work	0.301	0.312	0.251	-0.061	0.028	0.170
	(0.0159)	(0.0351)	(0.0166)	(0.0362)	(0.0009)	(0.0366)
Adults	2,722	2,224	498		188,324	1,937

The unit of observation is an adult. Standard errors computed assuming correlation of errors at the village level in parentheses. The first four columns present means based on subsets of the adults aged 14 to 69 from the main data set discussed in the paper. The first column includes the full sample of persons aged 14 to 69 for whom the adult survey was attempted. The second column includes all persons aged 14 to 69 for which the full adult survey was completed. The third column includes all persons aged 14 to 69 for which the full adult survey was not completed. The fourth column presents the difference between the third and second columns. The fifth and sixth columns present means computed using all adults aged 14 to 69 in the rural sample of the NSS Employment and Unemployment survey Round 64 conducted between July 2007 and June 2008 for all of India and for the six sample districts respectively. Means from the NSS survey are constructed using sampling weights. "--" denotes not available.

Table A.2: Reasons of demand for NREGA work

	Want more NREGA Work?		
	(1)	(2)	(3)
Female	-0.0286*	-0.0272	-0.0107
	(0.0165)	(0.0167)	(0.0172)
Primary Education	-0.0545*	-0.0448	-0.0385
	(0.0301)	(0.0290)	(0.0288)
Education Beyond Primary	-0.167***	-0.143***	-0.121***
	(0.0380)	(0.0367)	(0.0346)
Age 30 to 45	0.0486**	0.0560**	0.0679***
	(0.0226)	(0.0220)	(0.0219)
Age higher than 45	-0.0941***	-0.0871***	-0.0476
	(0.0320)	(0.0320)	(0.0306)
Married	0.0891***	0.0941***	0.0831***
	(0.0221)	(0.0220)	(0.0222)
Speaks Gujarati	-0.00102	0.000789	-0.0177
	(0.0381)	(0.0381)	(0.0396)
Speaks Hindi	-0.0403	-0.0395	-0.0365
	(0.0249)	(0.0249)	(0.0249)
Salaried Job		-0.279***	-0.250***
		(0.0808)	(0.0787)
Migrated			0.0882***
			(0.0203)
Observations	2,224	2,224	2,224
State fixed effects	Yes	Yes	Yes

The unit of observation is an adult. Each column reports marginal effects at the means from a separate probit estimation. The dependent variable is a dummy variable for whether the individual reports willingness to work more days for the NREGA during the summer 2009 if work were available. ***, ** and * indicate significance at the 1, 5 and 10 percent level. Standard errors are clustered at the village level.

Table A.3: Migration and NREGA Work

	Gujarat	Madhya Pradesh	Rajasthan	Whole Sample
	(1)	(2)	(3)	(4)
Panel A: Summer (March-July 2009)				
Worked for NREGA	10%	39%	50%	40%
NREGA days worked if participated	25.3	21.7	31.7	28.1
Would have done more NREGA work	78%	79%	81%	80%
Days of NREGA work desired	48.7	41.4	44.3	43.9
Migrated	34%	41%	30%	35%
Migrated and worked for NREGA	2%	15%	13%	12%
Would have migrated if no NREGA work	3%	8%	10%	8%
Migrated and would do more NREGA work	30%	36%	26%	30%
Panel B: Monsoon (July-November 2009)				
Worked for NREGA	0%	0%	1%	0%
NREGA days worked if participated	0.0	13.5	29.7	26.1
Would have done more NREGA work	63%	50%	53%	54%
Days of NREGA work desired	27.4	17.9	22.1	21.5
Migrated	18%	7%	9%	10%
Migrated and worked for NREGA	0%	0%	0%	0%
Would have migrated if no NREGA work	0%	0%	0%	0%
Migrated and would do more NREGA work	13%	5%	7%	7%
Panel C: Winter (November 2009-March 2010)				
Worked for NREGA	2%	10%	5%	6%
NREGA days worked if participated	21.5	16.1	20.1	18.0
Would have done more NREGA work	75%	74%	76%	75%
Days of NREGA work desired	45.5	36.4	46.0	42.7
Migrated	35%	28%	28%	29%
Migrated and worked for NREGA	1%	3%	1%	2%
Would have migrated if no NREGA work	1%	2%	1%	2%
Migrated and would do more NREGA work	30%	24%	25%	25%
Adults	330	749	1145	2224

Source: Retrospective questions from the 2010 survey. The unit of observation is an adult.

Table A.4: Effect of the NREGA on Seasonal Migration (All Adults)

	NREGA Days		Days away		Any migration trip	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: All village pairs						
Rajasthan	-0.0885	-0.420	-3.940**	-1.365	-0.0425	-0.00455
	(0.165)	(0.389)	(1.954)	(1.279)	(0.0258)	(0.0157)
Summer (March-July)	5.569***	5.569***	12.13***	12.13***	0.168***	0.168***
	(0.776)	(0.779)	(1.686)	(1.692)	(0.0197)	(0.0198)
Rajasthan x Summer	8.235***	8.235***	-4.380*	-4.380*	-0.0571**	-0.0571**
	(1.043)	(1.047)	(2.197)	(2.205)	(0.0253)	(0.0254)
Observations	7,779	7,779	7,779	7,779	7,779	7,779
Control Mean	0.60	0.60	15.21	15.21	0.25	0.25
Worker Controls	No	Yes	No	Yes	No	Yes
Village Pair Fixed Effect	No	Yes	No	Yes	No	Yes
Panel B: Excluding pairs with Gujarat						
Rajasthan	-0.203	-0.178	-3.003	-3.344**	-0.0248	-0.0178
	(0.202)	(0.440)	(1.983)	(1.272)	(0.0274)	(0.0173)
Summer (March-July)	7.127***	7.127***	16.13***	16.13***	0.213***	0.213***
	(0.905)	(0.909)	(1.826)	(1.834)	(0.0218)	(0.0219)
Rajasthan x Summer	6.779***	6.779***	-7.260***	-7.260***	-0.0904***	-0.0904***
	(1.245)	(1.250)	(2.533)	(2.544)	(0.0287)	(0.0288)
Observations	5,445	5,445	5,445	5,445	5,445	5,445
Control Mean	.77	.77	12.47	12.47	.21	.21
Worker Controls	No	Yes	No	Yes	No	Yes
Village Pair Fixed Effect	No	Yes	No	Yes	No	Yes

The unit of observation is an adult in a given season. The sample includes adults which were not interviewed personally but for whom NREGA work and migration days have been reported by the household head. Results in Panel B are based on pairs of villages in Madhya Pradesh and Rajasthan only. Column One and Two presents results from a regression of days spent working on the NREGA during a particular season on a set of explanatory variables. In Column Three and Four the outcome is the number of days spent away for work. In Column Five and Six the outcome is a binary variable equal to one if the adult spent some time away for work during a particular season. Rajasthan is a dummy for whether the adult lives within a village in Rajasthan. Summer is a dummy for the summer months (mid-March to mid-July). Control Mean is the mean of the outcome variable in villages which are not in Rajasthan outside of the summer months. Standard errors are clustered at the village level. ***, ** and * indicate significance at the 1, 5 and 10 percent level.

Table A.5: Predictions of Migration and NREGA Earnings in the Summer 2009

	Migration earnings	Migration earnings	NREGA earnings	NREGA earnings
	(1)	(2)	(3)	(4)
No earnings observed in summer 2010	38.78***	36.74***	20.55***	16.60**
	(7.194)	(7.121)	(6.324)	(6.957)
Daily earnings in summer 2010	0.317***	0.298***	0.295***	0.242***
	(0.0582)	(0.0563)	(0.0800)	(0.0882)
No earnings observed in winter 2009-10	17.37***	17.03***	6.206	4.372
	(6.056)	(5.993)	(8.201)	(8.140)
Daily earnings in winter 2009-10	0.152***	0.137***	0.00620	-0.0179
	(0.0525)	(0.0514)	(0.0907)	(0.0917)
No earnings observed in monsoon 2009	3.546	3.191	-	-
	(9.832)	(9.343)		
Daily earnings in monsoon 2009	0.0726	0.0780	0.105	0.0697
	(0.0667)	(0.0596)	(0.189)	(0.200)
Observations	568	568	238	238
Worker and Household Controls	No	Yes	No	Yes
R-Square	0.243	0.272	0.048	0.106
Mean observed earnings		101		65
Mean predicted earnings		102		66

The unit of observation is an adult. The sample is restricted to the 768 respondents who declared having migrated in the summer 2009. In Column 1 and 2, the sample includes only migrants for whom migration earnings during the summer 2009 are known. In Column 3 and 4 the sample includes only migrants who did NREGA work during the summer 2009. In Column 1 and 2 the variables "No earnings observed" and "Daily earnings" refer to migration earnings. In Column 3 and 4 they refer to NREGA earnings. Columns 2 and 4 include worker and household controls described in Table 1. The coefficient on "No earnings observed in the monsoon 2009" is missing in Column 3 and 4 because only there are too few (two) migrants who worked for NREGA during the monsoon 2009 to identify it. In Column 2 and 4 "Mean observed earnings" is the mean of the dependent variable for the regression sample, and "Mean predicted earnings" is the mean of the linear prediction based on regression estimates for all 768 migrants. Standard errors are clustered at the village-level. ***, ** and * indicate significance at the 1, 5 and 10 percent level.

Table A.6: Earnings Differentials between Migration and NREGA work

	Migrated	Migrated and Want More NREGA Work	Migrated and Do not Want More NREGA Work	Migrated and Worked for NREGA
	(1)	(2)	(3)	(4)
(1) Earnings per Day Outside Village	102.2	100.2	116.4	100.3
	(2.22)	(2.06)	(7.19)	(3.06)
(2) Earnings per Day of NREGA Work	66.7	66.6	67.4	66.4
	(0.73)	(0.79)	(0.8)	(1.73)
(3) Difference (1) - (2)	35.5	33.6	49.0	33.9
	(2.19)	(2.03)	(7.27)	(3.26)
Observations	768	672	96	267

The unit of observation is an adult. The first row presents the mean earnings per day outside the village during summer 2009 for different subsets of all migrants. For adults with missing earnings, earnings from migration trips taken during summer 2010 are used to predict earnings in summer 2009. The second row presents the mean of earnings per day worked for NREGA during summer 2009. For adults who did not work for NREGA or have missing earnings, earnings are predicted using summer 2010 NREGA earnings and a set of person-level characteristics. Standard errors computed assuming correlation of errors within villages in parentheses.

Table A.7: Cross-state comparison of permanent migration in the last five years

	Any Migrant		Number of Migrants	
	(1)	(2)	(3)	(4)
Panel A: All village pairs				
Rajasthan	0.0324	0.0400	0.0937	-0.0601
	(0.0369)	(0.0308)	(0.181)	(0.139)
Observations	702	702	702	702
Mean in Control	.39	.39	1.23	1.23
Panel B: Excluding pairs with Gujarat				
Rajasthan	0.0347	0.0529	0.112	0.0561
	(0.0463)	(0.0386)	(0.216)	(0.159)
Observations	503	503	503	503
Mean in Control	.4	.4	1.24	1.24
Household and Village Controls	No	Yes	No	Yes
Village Pair Fixed Effect	No	Yes	No	Yes

The unit of observation is a household. Results in Panel B are based on pairs of villages in Madhya Pradesh and Rajasthan only. In Column 1 and 2 the dependent variable a a dummy which equals one if any member of the household left within the past five years. In Column 3 and 4 it is the number of household members who left within the past five years. Controls include village and household controls presented in Table 1. Mean in Control is the average outcome in non-Rajasthan villages. Standard errors are clustered at the village level. ***, ** and * indicate significance at the 1, 5 and 10 percent level.